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ART. XVI.—*On the Botany, Geology, &c., of the country between Tamatave and Antananarivo, in Madagascar.* By C. MELLER, Esq., of H.M.S. "*Gorgon*."

[*Read 2nd March, 1863.*]

TO MAJOR-GENERAL JOHNSTONE, &c., &c., &c.

H.M.S. "*Gorgon*,"

MY DEAR SIR,

September 27th, 1862.

In compliance with your request that I should furnish a few particulars on the botanical features of the country we passed through, on our way to Antananarivo, I will reduce my journal, and give as many salient points of the road as I can remember, begging you to have in mind that, in so hurried a journey, it is impossible to do justice to the materials supplied, and that our visit having been made in the winter season, a just appreciation of the country could not be formed. From specimens of timber subsequently obtained from a part of the island, remote from that of our road to the capital, I am able to aver that no opinion of the size or value of the woods can be formed from any seen on our journey.

One might prognose more from the character of the soil than from the existing flora what the products might be. So long as our road lay southward, we passed over a sandy tract, the first part of which, between Tamatave and Iivondro, formed a plain, studded with copse, and sparsely covered with grass.

By the sea, at Tamatave, is a belt of trees at a distance resembling Mangroves, but on nearer inspection they are found to consist of small Myrtles, Cinchonias, and Brexiads, larger specimens of which are met further on the road. One of these trees, the *Inophyllum*, is used by the natives for making their smaller canoes, and for building purposes. There was nothing remarkable to be seen in our first day's journey, if we except the *Angræca* Orchid, and a few flowering shrubs and trees that are seen in greater perfection farther on. A tree with a small greenish-white flower, and round hard fruit, was very common so long as our road was by the sea. It is a species of *Strychnos* of the *Logania* order, and is called Voantaka by the natives, who are very fond of its refreshing acid pulp. There is another tree scattered about with this *Logania*, the

Zizyphus Bælei, of the Buckthorn order. It is the *Masaon* of the East Coast of Africa, and *Mason* of Mauritius. As I have mentioned edible fruits here, I may add there is a *Clusia* bush with plum-like fruit on the same plain; an *Anona*, called *Anatundirik* by the natives, and many *Leechees* and *Mangos*, but the latter have probably been imported; and from the way in which devotees resort to the shade for prayer and offerings to the gods, one may infer that they are held in some veneration.

In the first small wood we passed through, there were many orders represented, but we saw better specimens of the same farther on; amongst these the *Ficus Elastica* was conspicuous, and the first *Copal* gum trees seen; also some *Ardisiads*, with their strikingly beautiful foliage. As bushes rather than trees were some *Lauras*, *Brexiads*, and *Eucalypti*. The ferns common by the sea route have been noticed by former visitors,—varieties of *Poly-pody*, a *Pteris*, the *Langue de Bœuf*, an *Asplenium*, and a *Blechnum*, are very common, with several others.

Forming a barrier to the beach, and scattered about, are several species of *Pandanus*. It is said that the natives plant them by the coast to protect villages and plantations from sand-drift. From the denseness of some of these barriers, there can be no doubt that they must act in this way, whether planted for the purpose or not, and they must be far more efficient than the *Hottentot Fig* of the Cape, which I believe is held in esteem as a natural break-drift. Leaving *Ilivondro*, you will remember we passed by an extensive plain covered with timber in all stages of decay. Numbers of the dead trunks standing were topped or knobbed on the trunk or limbs with *pommes de fourmis*,—of a red ant.

Some parts of this plain seemed capable of fertility, having a sandy soil, with a thin superstratum of loam, but nowhere did the large trees thrive. May not the presence of these formidable ants account for this? Approaching the sea again, we found the *Pandanus*, *Casuarina*, and *Copal*, and the *Apocynaceous* order hitherto represented only by shrubs or herbs, such as the *Vinca Rosea* of the plains near *Tamatave* and *Anerium*, gives now the *Tanghinia Veneniflua*, the *Voan Sangan*, or ordeal poison of the *Malagash*, and a tree from which the natives procure *India-rubber*, called by them *Tanghinia*. We find now several species of *Aloes*, one like the *Agave*, a *Zamia*, and the *Cycas Circinalis*. By the lakes of the same part are seen two species of *Hibiscus*, and another of the *Malvaceous* order, with native name "*Lafa*," from the bark

of all three of which the natives obtain a strong fibre, from which they make twine and cord. Twining about these and other trees were several *Convolvuli*, one of which, an *Ipomœa*, is conspicuous; and near the same places a handsome little flowering *Petrea*. The *Arums* growing by the lakes are, as they have been represented, gigantic, and the *Nymphaeas* growing in the lake may be worth notice, as one of them, a *Lotos*, furnishes its bulb as food for the natives in times of dearth of more common food. In the marshy parts by the lakes we saw the large white *Crinum* lily, and near them another, a *Gloriosa*. Along by the sea, and inland to a (probable) height of 3,000 feet, we have citrons. Of flowering plants, the *Angræca* and *Daphnes* are abundant, also two smaller *Angræca* and a *Vanda* Orchid.

Turning westward from the sea, vegetation changes. We meet the *Ravanelle*, and it accompanies us for the next three days' journey, viz., to *Beforona*, where it is lost, at a (probable) height of 1,400 feet. It has been held incredible that the Traveller's tree should reach a height of thirty feet. There were several to be seen on our way, that must have far exceeded this. In the ravines, where the Traveller was first seen, was the *Bamboo* common to the country; but it was not until we reached the thicket woods that we found the creeping varieties. On the banks of the lake, between the sea and the first village of the ascent, were ferns in abundance,—*Hymenophyllum*, *Platycerium*, with the Stag's-horn moss, and overhanging them the *Jamrosin* tree, and several *Erythrinæ* with their bunches of scarlet flowers. Sugar cane and cotton grew on the lands about, and though both were of an inferior description, they were in a flourishing condition. The cotton is confined to one sort, and does not seem to be much cultivated; I saw only small quantities of it in the market at *Antananarivo*. At *Marombi*, the village from which the ascent commences, the ground is loamy—almost alluvial, and well adapted for rice growing; the natives have made large tracts available for this purpose. Here we saw the *Astrapea*, several *Acaciæ* and *Erythrinæ* growing, and round about the villages patches of wild raspberry and *Heliconia*. The raspberry leaf and fruit are used as a medicine for cough in young children, and a *Solanaceous* herb with blue flower, called "*Bred*," grows here abundantly; it is eaten as a vegetable, and given with other herbs as a medicine.

Before leaving the coast, I should have mentioned the peculiarity we noticed in the sand by the brackish lakes. It is very heavy, black, and full of shining particles resembling

pulverized plumbago. Rubbed in the hands, it leaves a black stain, which is not easily washed off. By the coast grew a heath, from four to eight feet high; it was met again on the red-clay hills, fifty miles south of the capital. One of the largest trees we leave with the sea was a *Barringtonia*. The *Barringtonia Speciosa* and this (another species) were also to be seen near Tanatave. By the village of Marombi were some trees of the *Cinchona* order, and shrubs of the *Vangueria Edulis*, or wild coffee of the country. For the three days occupied in passing from this to the entrance of the woods, we passed over fine grass hills, the ravines between which were filled with Traveller's tree, *Rofia*, and *Musada*. The road sometimes lay between rows of Composite trees and *Mimosæ*, and the higher we attained the more abundant did these become. By the rivers were some fine Copal and Betel-nut trees. The largest Copal seen was one by the Hivondro, which measured twenty-eight feet in circumference. From the soil of the ascent being at first of yellow clay, it had afterwards superimposed a layer of pebbles and detritus of quartz, and the river beds, from being at first of sand, later consisted of this and quartz and sandstone. I endeavoured to get some of the Ranomafana water, by making a valve at the end of a bamboo, such as the natives use for carrying water, and placing the mouth directly over one of the spots from which the hot jet was issuing. It is almost impossible to get the real temperature, unless a spring were isolated, as there must be more or less admixture with the cold water before the full effect is felt by the thermometer. The warm water obtained had a slight alkaline reaction, was insipid, and free of smell. A dollar previously brightened was put into the water, and observed after two days, when the surface was found of a brownish black colour.

Entering the woods, we lose the Traveller's tree, and find the tree-ferns. I noticed four varieties. They are most abundant between Beforona and Ancooca, that is to say, in the lowest and moistest part of the woods. Studding the hills and projecting in the ravines were boulders of sandstone, the exposed surface quite blackened; but there were scarcely any stones to be seen whilst passing through the first woods, the soil being wholly of clay, yellow and white stratified, and in some parts almost of the density of shale.

Pendent from most of the old trees, and fringing the trunks of both young and old, were many Lichens, Mosses, and *Lycopodiums*; the most abundant Lichen being of a yellowish green colour, much resembling *Rocella Fuciformis*. The trees were of no

magnitude. Two species of *Tilia*, or limes, grew to a height of sixty feet, and circumference of six (native name *Ilinzin*); there was also a tree with red wood, the sap of which stained the earth about the roots of the same colour. The *Varoan* and the *Salenti*, a species of *Gamboge*, were amongst the finest trees seen as to size. The ebony is scarce and very small; much finer is brought to Tamatave from woods of the north-west and other parts. *Sassafras* wood is got from here, and *Sarsaparilla* and *Calamba* were seen in several parts of the woods, and are abundant elsewhere. There were two trees with abundant yellow resin named "*Haringa*" and "*Kise*." I had no means of ascertaining their respective orders. In the moist parts of the woods were several plants with variegated leaves of beautiful colours. Of these a *Coleus*, a *Begonia*, *Sonerila*, and *Medinilla* were conspicuous. A shrub (*Pleroma*) with bright scarlet flower and brilliant pink-veined leaves was a common ornament of the road-side before, and for sometime after, leaving the woods. On one of the highest hills in the centre of the woods stood two palms (*Borassus*); these were the only ones of the kind seen. One was probably between seventy and eighty feet high. A *détour* from the village of *Analamagotra* brings one to some level peaty ground, surrounded by the woods. Here I picked up what appeared to be some surface coal, of a bituminous nature. A piece held in a flame burnt away with a brilliant light, leaving no residue. It was about here that we met for the first time the *Osmunda Regalis* fern; but we had it for the rest of the road. On the hill sides, after leaving the woods, we met the *Buddleia Madagascariensis* ("*Score*" of the natives); it forms the greatest ornament of the road to within forty miles of the capital; with it, on the hill sides and by our road, grew the Composite tree before mentioned, and two species of *Arbutus*.

The geological features of this part of the road have been pointed out by the former mission.

Thus far along the road we had had the houses made either entirely from the *Rofia* palm, and wooden planking or poles for supports, varied to split bamboo for sides, and grass for roofing. We met now with *Papyrus* in the marshes, and soon found this taking the place of the *Rofia* and of grass for roofing. We had this kind of roofing till arriving at the capital, where it is extensively used, but where also we found real tiles made of wood or clay, taking the place of it, for all the better houses.

The ravines after leaving the woods were less fertile than before, and in place of the loam soil which made them prolific

hitherto, there was now only a soil of yellow and red clays. The gneiss and black basaltic rocks were no longer seen studding the hills; in fact, the soil appeared to be of pure clays, and the stratification of them was exposed in the landslips twice seen by the way.

That at the Mangoro river exposes first a thin layer of sedimentary sandstone, beneath which is one of yellow clay, below this a red clay, mixed with a latent detritus, and below and penetrating this last, a mass of honeycombed lava-like matter.

It was not before reaching the bare hills about 20 miles south of the capital, that we saw the massive slabs and boulders of granite spoken of by former visitors, and it may be that the barrenness of the country round about renders them the more conspicuous.

It is only at the lowest part of valleys and at the bases of hills that the soil can be made productive; it is evident from the devices had recourse to to irrigate these green spots, how valuable they are for producing a small supply of rice for the teeming population round about. With the exception of a few heaths and ferns, Citrons, the *Buddleia*, and other hardy plants, there is but little vegetation after leaving M'batomanga; but that judicious care and irrigation will permit of the soil being made productive, was proved in our visits to the country round about Antananarivo, where we found Bananas, Fig-trees, a few *Rofias*, *Pandanas*, and prune and ornamental trees growing luxuriantly.

Visiting the country at so healthy a season, very little can be said of the diseases common to it. The little fever we saw had an intermittent character, but readily gave way to treatment. Hearsay evidence of its worst forms, however, would lead one to conclude that it rapidly destroys life, especially when it takes the irregular form of an alteration of hot and cold stages, with speedy supervention of Coma. Now that there are European medical men in the country, some reliable information may be looked for after the next unhealthy season.

There is certainly not so much syphilis as we were led to suppose, though the ravages have been frightful in isolated cases.

Again, we must remember that the natives know of no specific treatment, and the disease is sent down from generation to generation.

Though many natives are marked with the scars of small pox, I was led to understand that this disease is seldom deadly; insomuch that, though acquainted with the advantage of vaccination, they seldom have had recourse to it.

The skin diseases seem to be those common to the tropics, Impetigo, Lepra, Elephantiasis (only one case seen), secondary eruptions, &c., &c.

I append the names of woods obtained as specimens for the Admiralty, and of those in use with the natives for house and canoe building, with a few other particulars, and am,

My dear Sir,

Very faithfully, yours,

(Signed) CHARLES MELLER.

RETURN JOURNEY.

DEPARTURE.	Date.	Time.	ARRIVAL.	Date.	Time.	Distance in Miles.
	1862	A.M.		1862	P.M.	
Antananarivo	Au. 18	11.0	M'batomanga	Au. 18	4.0	18
M'batomanga	19	7.0	Mandranahody	19	3.0	20
Mandranahody	20	6.50	Moramanga	20	4.0	25
Moramanga	21	7.0	Analamazotra	21	3.0	18
Analamazotra	22	7.0	Beforona	22	3.30	18
Beforona	23	7.20	M'passimbé	23	3.0	20
M'passimbé	25	7.0	Monambohitra	25	5.0	20
Monambohitra	26	7.0	Andravakamenerana	26	3.0	20
Andravakamenerana	27	7.0	M'paurano	27	4.0	20
M'paurano	28	7.0	Tamatave	28	5.0	25
Total						204

THERMOMETER.

Maximum at noon, 85°. Minimum, between four and six o'clock, A.M., 49° (but Mr. Caldwell's party observed as low as 45°). Mean at noon, 75°.

NAMES OF WOODS PROCURED.

- BARAKA.**—Very hard and capable of fine polish; is used for making furniture and cabinet work.
- HAZOAMBA.**—50 to 60 feet high; very soon rots if not protected from moisture.
- HAZOMAINTY.**—Ebony; not much on the east coast; more and better on the west.
- HAZOMBATO.**—Grows to the northward of Tamatave, to 50 feet high, and 2 feet diameter. It is also used for making canoes.
- HAZOTSIMARIANA.**—Is plentiful, large, and used for buildings.
- HINTZY.**—Elastic, very strong wood; good for oars and planking; grows to 60 or 70 feet, from 2 to 4 feet diameter. It is plentiful in the Analanazobra woods, but not so large; the stem grows to 30 or 40 feet before branching.
- LANGOTRA.**—Grows to a very large size—to 60 and 80 feet, and 4 to 5 feet diameter. It is used in making pirogues.
- MARANOHOTRA.**—Used for buildings, grows to 80 feet, and 4 feet diameter.
- NANTO (1st kind).**—Grows from 40 to 70 feet high, and to 2 or 3 feet diameter.
- NANTO (2nd species).**—Of same order and kind as 1st species.
- NANTO (3rd species).**
- NANTO (4th species).**
- ORONDRY.**—Good for making planks, grows from 40 to 50 feet high.
- VINTANGHO.**—For pirogues; 80 to 100 feet; dark; is plentiful.
- VOANTSILAMY.**—This is very abundant, growing to a height of 40 or 50 feet, with circumference of 4 to 6 feet. It is a good durable wood.

DURABLE WOODS USED FOR MAKING CANOES.

- HAZOCEREA.**—Red wood, plentiful.
- INCL.**—Yellow, abundant.
- MARA.**—Very durable black wood.
- RANDRAHO.**—Very abundant, but not so durable as the rest.
- SUNGUT.**—Brown, takes a good polish, and is very durable.

I collected a few specimens, with many names of native fruits, and have sent them to Sir Wm. Hooker, at Kew.¹

¹ See Dr. Meller's letter to Sir W. Hooker, *Linnæan Journal*, No. 26, p. 57, vol. vii.

Without specimens of the fruits the names are almost useless, except for any one intending to make a visit to collect these things. I therefore omit them.

I obtained also several native medicines, and the names of trees held in repute for medicinal virtues. Several of them are for blistering; one, a *Ranunculus*, is a very efficient blister. The small leaves of the herb are pounded in a mortar, and the expressed juice is bound on the part to be blistered.

Another, the *Menerana*, is the oil expressed from a fruit (a *Euphorbia*, I believe). It consolidates to the consistence of butter. It is the universal ointment of the country, and really seems to have good properties—stimulant for ulcers, bites of insects, and for the greater number of skin eruptions.

The *Voingoamba* is a herb (of the nettle tribe), the leaves of which have a volatile principle. They medicate a vapour bath with these, and have recourse to the bath in the cold stage of fever—in syphilis, &c., &c.

There are several emetics in use, the most common of which is their native salt (that got from the ashes of the *Sirahaz* plant). When this is not effective, they mix it with bruised leaves of the *Mango*, and drink the infusion; and if this is not sufficient, they drink an infusion of a powerfully emetic herb, the "*Yazeazea*."

Sarsaparilla is abundant in the woods, and in common use as a soothing medicine in gastric disorders, dysentery, &c.

I took the names of many more, specimens of which I could not procure in the short time left after the "*Gorgon*" arrived.

(Signed) C. MELLER.
